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THE NORTHLAND SKY WATCHER

For National Weather Service weather watchers of northeastern Minnesota and northwestern Wisconsin

A Change in the Wind Chill Index

National Weather Service Changes Wind Chill Formula

Anyone who has experienced the biting cold wind on uncovered cheeks and noses can attest to the fact that the wind does have a cooling effect on the human skin.

Starting with this winter season, the National Weather Service will use a new Wind Chill Temperature Index, designed to calculate a more accurate reading of how the cold air feels on skin. Since 1945, the United States has used an index which relied on observed winds 33 feet above the ground, and focused on how fast the cold temperatures- combined with winds- made water freeze. The new index accounts for the wind effects at face level, and a better calculation for body heat loss. For example, under the old index system, an air temperature of 20 degrees, with a 15 mph wind, translated into a reading of five degrees below zero. The new index calculation would translate the same conditions to six degrees above zero.

"Exposure to cold, biting air for long periods of time is dangerous. Our main goal was to use modern science in revising the index so that it's more accurate and makes the human impact more prominent."

- retired General Jack Kelly,

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The new index will be based on:

- Wind speed calculated at the average height of the human face, about five feet (the face is most often exposed to the cold).
- An updated heat transfer theory, which factors in heat loss from the body to its surroundings during cold, windy days.
- A consistent standard for skin tissue resistence.
- Clear night sky conditions.
- A lowered calm wind threshold from 4 mph to 3 mph.

For the past year, the National Weather Service has led a team of international scientists with the goal of creating an international standard wind chill index among the meteorological community.

Last spring, the scientists conducted clinical trials and the results helped to verify and improve the accuracy of the new formula. It was found that at a wind chill of -18, frostbite occurs on exposed skin in 15 minutes, at a wind chill of -31, frostbite occurs in 10 minutes, and at a wind chill of -72, frostbite occurs in 2 minutes.

New Wind Chill Chart

Wind (mph)

Temperature (°F)	Calm	5	10	15	20	25	30	35	40	45	50	55	60
	40	36	34	32	30	29	28	28	27	26	26	25	25
	35	31	27	25	24	23	22	21	20	19	19	18	17
	30	25	21	19	17	16	15	14	13	12	12	11	10
	25	19	15	13	11	9	8	7	6	5	4	4	3
	20	13	9	6	4	3	1	0	- 1	- 2	- 3	- 3	- 4
	15	7	3	0	- 2	- 4	- 5	- 7	- 8	- 9	- 10	- 11	- 11
	10	1	- 4	- 7	- 9	- 11	- 12	- 14	- 15	- 16	- 17	- 18	- 19
	5	- 5	- 10	- 13	- 15	- 17	- 19	- 21	- 22	- 23	- 24	- 25	- 26
	0	- 11	- 16	- 19	- 22	- 24	- 26	- 27	- 29	- 30	- 31	- 32	- 33
	- 5	- 16	- 22	- 26	- 29	- 31	- 33	- 34	- 36	- 37	- 38	- 39	- 40
	- 10	- 22	- 28	- 32	- 35	- 37	- 39	- 41	- 43	- 44	- 45	- 46	- 48
	- 15	- 28	- 35	- 39	- 42	- 44	- 46	- 48	- 50	- 51	- 52	- 54	- 55
	- 20	- 34	- 41	- 45	- 48	- 51	- 53	- 55	- 57	- 58	- 60	- 61	- 62
	- 25	- 40	- 47	- 51	- 55	- 58	- 60	- 62	- 64	- 65	- 67	- 68	- 69
	- 30	- 46	- 53	- 58	- 61	- 64	- 67	- 69	- 71	- 72	- 74	- 75	- 76
	- 35	- 52	- 59	- 64	- 68	- 71	- 73	- 76	- 78	- 79	- 81	- 82	- 84
	- 40	- 57	- 66	- 71	- 74	- 78	- 80	- 82	- 84	- 86	- 88	- 89	- 91
	- 45	- 63	- 72	- 77	- 81	- 84	- 87	- 89	- 91	- 93	- 95	- 97	- 98

Frostbite occurs in 15 minutes or less

$$\text{Wind Chill } (^{\circ}\text{F}) = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T = Air Temperature (°F)
V = Wind Speed (mph)

Spring/Summer Weather Highlights

Two strong tornadoes top the list

Two strong tornadoes hit the northland in June. At 8:10 pm on June 13 an F2 tornado hit 1 mile south of Brainerd, MN and traveled northeast for five miles before lifting. The tornado tore roofs off houses and blew out exterior walls. Pole barns and sheds were destroyed and thousands of trees were knocked down. The tornado was ½ mile wide. Almost six inches of rain fell that night, which caused small stream flooding, ponding, and basement flooding. Damage estimates total $2.25 million from the storm.

Less than a week later, on June 18, a tornado formed from a classic supercell storm near Grantsburg, WI. The tornado traveled east and hit the town of Siren at 8:20 pm where it destroyed 200 homes. It continued east through Dewey Township, where it killed two people, and lifted 3 miles west of Spooner. The tornado was labeled an F3 on the Fujita scale of tornado intensity with winds estimated up to 206 miles an hour. The tornado was on the ground for 54 minutes and traveled 34 miles.

Here are other summer weather highlights from northwestern Wisconsin and northeastern Minnesota:

- In April, flooding due to melting snow and heavy rain affected Aitkin and Pine counties in Minnesota and Douglas and Bayfield counties in Wisconsin.
- On April 23 a major ice storm coated trees, power lines, and roads with an inch of ice in southern Lake, southern St. Louis, and Carlton counties in Minnesota. Some people were without power for three days. Damage from the ice storm was estimated at $4.2 million.
- Also on April 23, a late season storm dumped heavy snow over parts of north central Minnesota. Eight inches fell at Northhome, 7 inches at Little Fork, and 6.5 inches in Wirt.
- On May 1 an F0 (weak) tornado touched down 3.3 miles west-northwest of Grantsburg, WI, and lifted 2.8 miles west-northwest of Grantsburg.
- On June 11, a cluster of storms produced winds over 60 mph that caused widespread tree damage over southern areas of Burnett, Washburn, Sawyer, and Price counties of northern Wisconsin.
- On July 5, northern Minnesota had a frost ,with Tower and Embarrass reporting 27 degrees.
- On July 17 a long-lived thunderstorm outbreak dropped widespread hail up to golf ball size and produced damaging winds over Cass, southern Koochiching, and Crow Wing counties.
- On July 31 a series of storms packing high winds hit the border country of northern Minnesota. Thousands of trees were felled from Birchdale to Pelland and more trees were downed in the Kabetogama Lake area and on Rainy Lake. A microburst hit a home near Ash River, demolishing the garage, lifting part of the home's roof, and shattering windows.
- August 5-8: Hot and muggy conditions produced dangerous Heat Indices of 100 to 110 over northeastern Minnesota and northwestern Wisconsin. The heat contributed to five deaths in Duluth.

The June 18, 2001, Siren tornado. Photo taken at 815 pm CDT. The tornado was ½ mile wide and was 1 ½ miles from the photographer.

Groups Recognized For Their Service

They are called out anytime day or night to come to the aid of the National Weather Service. They might stay in the comfort of their homes, or hop in the car and go to their community's emergency operations center, or go to the National Weather Service Office. These are the amateur radio operators who selflessly provide hours of communications for the National Weather Service during severe weather outbreaks.

While there are many groups of hams who band together during severe weather to provide crucial information to the NWS, two groups were singled out for their outstanding support- the NorWesCO RACES and the NWS Skywarn Responders. Also recognized for their contributions to the severe weather program and Skywarn program were the fine people of the Crow Wing County Emergency Management Team.

For the past seven years the National Weather Service in Duluth has relied on the Skywarn-trained NorWesCo spotters to help us let the people of Burnett, Washburn, and Sawyer Counties know when severe weather is coming so they can take appropriate safety measures.

The NorWesCo Skywarn Group installed a network of transmitters and repeaters to ensure their severe weather reports get directly to the National Weather Service ham desk, and ultimately, to the warning team.

The NWS warning team includes the ham radio operators who serve as a clearing house for all the activated Skywarn ham networks. These hams who come to the weather office have been specially trained to work in the National Weather warning atmosphere.

Although the evening of June 18, 2001, shows how much the NorWesCo Skywarn Group and the NWS Skywarn Responders can help the National Weather Service issue timely warnings and statements, this is just one of numerous events in which they played an important role.

During the June 18 tornado, their information helped save lives. Fifteen minutes before touchdown, NorWesCo spotters gave the warning meteorologists excellent information about the rotation in the storm that confirmed our suspicions- a tornado was forming. The National Weather Service used the information to give more specific information to those in harm's way so they would take protective action. It worked- many people rode out the storm in basements and small interior rooms- just like they should.

For their years of selfless sacrifice in storm spotting for the Skywarn program, we were pleased to present them plaques and certificates of appreciation.

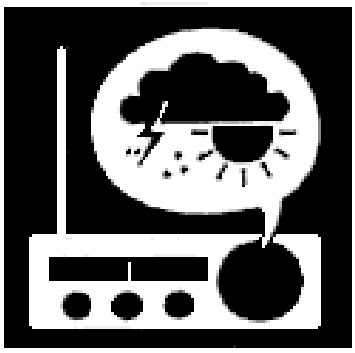
From all of us at the National Weather Service to all of our spotters- THANK YOU!

Doug Nelson, top photo, coordinator of the Skywarn NWS Ham Responders, and Wes Jones, bottom photo, coordinator of the NorWesCo RACES, receive plaques of appreciation from Carol Christenson, Duluth Warning Coordination Meteorologist, and NWS Central Region Director Dennis McCarthy.

NWR Expansion Going Full Steam Ahead

The campaign to cover the northland with NOAA Weather Radio (NWR) broadcasts is progressing. Last month the NWR transmitter began broadcasting weather information to the Grand Rapids, MN area from a transmitter located in Coleraine. This transmitter was funded by Itasca County and federal mitigation grant money.

By the end this year, the following additional sites should be operational: In Minnesota- Leader, Aitkin, Orr, and Virginia, and in Wisconsin - Ashland and Grantsburg. A NWR transmitter is planned for Pine City, MN, and it should be running next spring.



New Voices of the NWS

Tired of the drone of "Ole" on NWR? Well- keep your NWR tuned in because improvements are on the way!

The National Weather Service is replacing the computer-synthesized voice currently used on the NOAA Weather Radio System.

After months of evaluating voice technologies and receiving public input, including over 19,000 Internet survey comments, the National Oceanic and Atmospheric Administration (NOAA) has awarded Siemens Information and Communication Network of Boca Raton, Florida, a $633,615 contract for the voice improvement software product, known as Speechify.

The contract includes a male and a female voice. Of the comments received in the web page public opinion survey, the voice named "Craig" was voted number 1, and the winning female voice was "Donna". National implementation of the new voices on NOAA Weather Radio is planned for early 2002. You can listen to the new voices at *www.nws.noaa.gov/nwr/newvoice.htm*.

More Staff Changes at the NWS

Our new Science and Operations officer is **Ed Shimon**. Before being appointed to his new position, Ed was a forecaster here. Ed graduated from the University of Wisconsin-Madison and spent 3 years in the Navy. After a stint with a private weather company in Madison, he was hired by the NWS in Madison, then he came to Duluth in 1996.

To take Ed's place, we hired forecaster **Tim Erickson** from the Lake Charles, LA weather office. Born and raised Louisiana, he is eager to the meet challenge of forecasting snow. Tim graduated from Northeast Louisiana University in 1996. While in college he was the local TV meteorologist in Monroe, LA. Tim joined the NWS at Lake Charles in 1997 and stayed there until transferring to Duluth. Accompanying Tim on his move is his wife, Louise (a Winnipeg native), daughter Skylar, 6, and son Dylan, 3. Son Mason was born in Duluth just a few weeks ago, and is now a native Minnesotan.

Dave Tomalak was a forecaster here, but when a new position was created, the Information Technology Officer (ITO), he jumped on it and was chosen. For him it is a perfect fit- combing his love of weather (the colder and snowier, the better) and his love of computers. A Wisconsin native, Dave graduated from UW-Madison. Before coming to Duluth he was at Great Falls, MT. He's also worked at the Reno, NV, and Eureka, CA, weather offices.

With Dave filling the ITO position, we had another vacancy. This is where **Terrence Beltz** comes in. Terry will be coming here in a few weeks from Missoula, MT, where he was a forecaster. Originally from Inver Grove Heights, MN, Terry graduated from the University of North Dakota in 1991. He also worked at the Grand Junction and Limon, CO, offices. Terry brings a wide range of outreach experience to our office, so many of you will likely meet him during Skywarn training season.

Are you Ready for Winter?

Although the calendar says winter does not officially start until December 21 at 8:21 am, we know better. Winter can unfurl its onslaught of bitter cold, snow, sleet, and freezing rain anytime in the autumn months. (Remember the Halloween snowstorm?) Even with the thought of the sweltering August heat still in our minds, we need to start planning for winter now.

The Basics

- We all know this, but it doesn't hurt to be reminded- get your car winterized, check your furnace, wood burning stove, and fireplaces to make sure they are up to par.
- Get the snow blower ready! Maybe invest in some good shovels now (while they are still available.)
- Get a supply of bottled water and non-perishable food items. Think of what you would need if you could not get out for three days- then stock up. Here are some ideas: batteries, candles, battery-operated radio, canned food, water, baby items (diapers, formula, food), toiletries, and medicines.

During the Storm

- Hunker down and enjoy the time with your family. Check on elderly neighbors.
- Snowfall spotters- You know who you are! Have our phone number handy and call us with your snowfall amounts. Be sure to call us with a storm total when the snow ends.
- If using an alternate heat source, maintain ventilation to avoid build-up of toxic fumes.

After the Storm

- Dig out slowly to avoid overexertion. The strain from the cold and the hard labor may cause a heart attack. Sweating could lead to a chill and hypothermia.
- Protect your lungs from extremely cold air by covering your mouth when outdoors.

Know Your Winter Precipitation

What kind of precipitation do we get in winter? Obviously snow- everybody knows that. But dedicated weather watchers can observe other kinds of cold season precipitation here in the Northland. The following are official definitions of most of them. If you have observed something else that you couldn't identify, let us know and we'll try to help you out.

- **Snow:** Precipitation of snow crystals, mostly branched in the form of six-pointed stars.
- **Snow Grains:** Precipitation of very small, white, and opaque grains of ice - the solid equivalent of drizzle. They neither bounce nor shatter when striking a hard surface.
- **Snow Pellets:** Precipitation of white, opaque grains of ice. The grains are round or sometimes conical. They are brittle, crunchy, and larger than snow grains, and tend to break or bounce when they strike a hard surface.
- **Ice Crystals ("Diamond Dust"):** A fall of unbranched ice crystals in the form of needles, columns, or plates. (Note that snow crystals are branched.) They often seem to float in the air and can fall from a cloud or even from a cloudless sky.
- **Ice Pellets (commonly called sleet):** Precipitation of transparent or translucent pellets of ice, which are round or irregular, rarely conical. They often bounce on impact and make a rattling sound on windows.
- **Freezing Rain/Freezing Drizzle:** Precipitation which forms in an atmosphere warm enough to be liquid but then freezes on contact with surfaces whose temperatures are below freezing, causing glaze. Major ice storms are the result of freezing rain.

- Ed Flenz, meteorologist

Co-op Corner

Attention co-op observers with Fisher-Porters! Here are several things to keep in mind when changing the tape:

1. Always use red ink when writing on the tape.
2. Please leave a foot of blank tape at the beginning and at the end of the tape. When we send in your tape, it's read by a machine and then archived. Without the extra tape, someone must add it to the tape, which is time-consuming. There are nearly 3000 tapes a month sent to the National Climatic Data Center for archiving.
3. Please make sure you have the station number, name, start and end dates, and times on your tape.
4. If you have a problem with the equipment or need supplies, call or send a note along with your monthly tape. We will respond as quickly as we can.

With winter approaching, remember to remove the funnel and tube from inside your rain gauge!

Pam Peterson has been our Cotton, MN observer for the past 5 ½ years, and we are sorry she had to quit this fall. She became a co-op observer when she was 12 years old. We wish her well as she starts college at Ashland, WI, this fall to pursue her dream of being a veterinarian. We welcome Pam's neighbor, Connie Koppenhaver, as our newest co-op observer. Connie lives a half mile down the road from Pam. We appreciate her volunteering to take over.

It's not unusual for an observer to volunteer for 10 or 20 years, but few make it to 40 years as did Walter Johnson, of Wright, MN. Along with Meteorologist in Charge Mike Stewart and Sam Standfield, I presented Walter an award for 40 years of dedicated service to the co-op program. When severe or unusual weather hits Carlton County, we know that Walter will be calling in with a report. Congratulations, Walter!

We appreciate the dedication that we see from all of our observers year after year. It's not always easy changing the tape when its 20 to 50 below zero or while fighting mosquitoes and thunderstorms in the summer.

- Daniel Markee, Co-op Program Manager

Walt Johnson, center, accepts a 40 Year Cooperative Observer Award from Co-op Program Manager Dan Markee, left, and Meteorologist in Charge Mike Stewart, right.

The *Northland Sky Watcher* is a newsletter published by the National Weather Service Office in Duluth, MN for our weather spotters and observers. We welcome your questions and comments. We can be reached by:

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Visit our homepage on the internet at
www.crh.noaa.gov/dlh/duluth.htm

Be careful this winter!

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